<110> TABOLINA, EKATERINA
RYBAK, KONSTANTIN
KHOURGES, EVGENI
VOROSHILOVA, ELVIRA
GUSYATINER, MIKHAIL

<120> METHOD FOR PRODUCING L-AMINO ACID USING BACTERIA BELONGING TO THE GENUS ESCHERICHIA

<130> 219594US0

<140> 10/073,293
<141> 2002-02-13

<150> RU 2001103865
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<150> RU 2001104998
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<150> RU 2001117632
<151> 2001-06-28

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<170> PatentIn version 3.1

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Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met
1               5                   10                  15

gaa gga tgc aaa gac agt tta ccg att gtt att agt tat att ccg gtg       96
Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val
            20                  25                  30

gcc ttt gcg ttc ggt ctg aat gcg acc cgt ctg gga ttc tct cct ctc      144
Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu
        35                  40                  45

gaa agc gtt ttt ttc tcc tgc atc att tat gca ggc gcg agc cag ttc      192
Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe
    50                  55                  60

gtc att acc gcg atg ctg gca gcc ggg agt agt ttg tgg att gct gca      240
Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala
65                  70                  75                  80

ctg acc gtc atg gca atg gat gtt cgc cat gtg ttg tat ggc ccg tca      288
Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser
                85                  90                  95

ctg cgt agc cgt att att cag cgt ctg caa aaa tcg aaa acc gcc ctg      336
Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu
            100                 105                 110

tgg gcg ttt ggc ctg acg gat gag gtt ttt gcc gcc gca acc gca aaa      384
Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys
        115                 120                 125

ctg gta cgc aat aat cgc cgc tgg agc gag aac tgg atg atc ggc att      432
Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile
    130                 135                 140

gcc ttc agt tca tgg tca tcg tgg gta ttt ggt acg gta ata ggg gca      480
Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala
145                 150                 155                 160

ttc tcc ggc agc ggc ttg ctg caa ggt tat ccc gcc gtt gaa gct gca      528
Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala
                165                 170                 175
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tta ggt ttt atg ctt ccg gca ctc ttt atg agt ttc ctg ctc gcc tct      576
Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser
            180                 185                 190

ttc cag cgc aaa caa tct ctt tgc gtt acc gca gcg tta gtt ggt gcc      624
Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala
        195                 200                 205

ctt gca ggc gta acg cta ttt tct att ccc gtc gcc att ctg gca ggc      672
Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly
    210                 215                 220

att gtc tgt ggc tgc ctc act gcg tta atc cag gca ttc tgg caa gga      720
Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly
225                 230                 235                 240

gcg ccc gat gag cta tga                                             738
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                245
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1               5                   10                  15

Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val
            20                  25                  30

Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu
        35                  40                  45

Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe
    50                  55                  60

Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala
65                  70                  75                  80

Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser
                85                  90                  95

Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu
            100                 105                 110
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Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys
        115                 120                 125

Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile
    130                 135                 140

Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala
145                 150                 155                 160

Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala
                165                 170                 175

Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser
            180                 185                 190

Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala
        195                 200                 205

Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly
    210                 215                 220

Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly
225                 230                 235                 240

Ala Pro Asp Glu Leu
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Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn
1               5                   10                  15

tat tgc ttc cgc tat ttg ccg ctg cgc ctg cgt gtg ggt aat gcc cgc       96
Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg
            20                  25                  30

cca acc aaa cgt ggc gcg gta ggt att ttg ctc gac acc att ggc atc      144
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Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile
        35                  40                  45

gcc tcg ata tgc gct ctg ctg gtt gtc tct acc gca cca gaa gtg atg      192
Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met
    50                  55                  60

cac gat aca cgc cgt ttc gtg ccc acg ctg gtc ggc ttc gcg gta ctg      240
His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu
65                  70                  75                  80

ggt gcc agt ttc tat aaa aca cgc agc att atc atc cca aca ctg ctt      288
Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu
                85                  90                  95

agt gcg ctg gcc tat ggg ctc gcc tgg aaa gtg atg gcg att ata taa      336
Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile
            100                 105                 110


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<211>  111
<212>  PRT
<213>  Escherichia coli

<400>  6

Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn
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Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg
            20                  25                  30


Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile
        35                  40                  45


Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met
    50                  55                  60


His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu
65                  70                  75                  80


Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu
                85                  90                  95


Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile
            100                 105                 110


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<400> 8
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<213> Artificial Sequence

<220>
<223> Synthetic DNA

<400> 9
ggtctagata tggctaacat tatccggc 28

<210> 10
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<212> DNA
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<220>
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<400> 10
ccggatccaa acggagcatg gcagctcc 28

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1               5                   10                  15

ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc       96
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile
            20                  25                  30

agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt      144
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu
        35                  40                  45

aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc      192
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu
    50                  55                  60

ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt      240
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg
65                  70                  75                  80

atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc      288
Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser
                85                  90                  95

ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc      336
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr
            100                 105                 110

gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg      384
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met
        115                 120                 125

gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat      432
Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr
    130                 135                 140

cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc      480
His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe
145                 150                 155                 160

gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg      528
Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg
                165                 170                 175

gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta      576
Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu
            180                 185                 190

ttg ctg atg gca ttg ggg att gaa ttt atc gtt act ggt att aag ggg      624
Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly
        195                 200                 205

att ttc ccc ggc ctg ctt aat taa                                     648
Ile Phe Pro Gly Leu Leu Asn
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Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu
35 40 45

Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu
50 55 60

Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg
65 70 75 80

Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser
85 90 95

Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr
100 105 110

Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met
115 120 125

Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr
130 135 140

His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe
145 150 155 160

Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg
165 170 175

Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu
180 185 190

Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly

195 200 205

Ile Phe Pro Gly Leu Leu Asn
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1 5 10 15

ccg ctc gga aac cta cct att ttc atg tcc gta ctg aaa cat act gaa 96
Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu
20 25 30

ccg aaa aga cgg cgg gca atc atg gtg cga gag ttg ctt att gct ctc 144
Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu
35 40 45

ctg gtg atg ctg gtg ttc ctg ttt gcg ggt gag aaa att ctg gca ttt 192
Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe

```
    50                  55                  60

ctt agc cta cga gca gaa acc gtc tcc att tct ggc ggc atc att ctg      240
Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu
65                  70                  75                  80

ttt ctg atc gcc att aaa atg att ttc ccc agc gct tca gga aat agc      288
Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser
                85                  90                  95

agc ggg ctt ccg gca ggt gaa gag cca ttt atc gtg ccg ttg gca att      336
Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile
            100                 105                 110

ccg tta gtc gcc ggg ccg act att ctc gcc acg ctg atg ttg ttg tct      384
Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser
        115                 120                 125

cat cag tac ccg aat cag atg ggg cat ctg gtg att gct ctg ctg ctg      432
His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu
    130                 135                 140

gcc tgg ggc ggc acc ttt gtc atc ctg cta cag tct tcg cta ttt tta      480
Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu
145                 150                 155                 160

cgt ctg ctg ggc gag aaa ggg gtg aac gca ctt gaa cgc ctg atg gga      528
Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly
                165                 170                 175

ttg att ctg gtg atg atg gca acc cag atg ttc ctc gac ggc att cga      576
Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg
            180                 185                 190

atg tgg atg aag ggg taa                                             594
Met Trp Met Lys Gly
        195
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Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu
            20                  25                  30

Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu
        35                  40                  45
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Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe
    50                  55                  60

Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu
65                  70                  75                  80

Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser
                85                  90                  95

Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile
            100                 105                 110

Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser
        115                 120                 125

His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu
    130                 135                 140

Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu
145                 150                 155                 160

Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly
                165                 170                 175

Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg
            180                 185                 190

Met Trp Met Lys Gly
        195
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